

NEW NORTH AMERICAN MYRMECOPHILOUS
SCARABAEIDAE (COLEOPTERA—
CREMASTOCHEILUS).

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The present paper is an attempt to correct the status of various species and genera in the *Cremastocheilini* as well as to make known a number of previously undescribed species.

The author would like to extend his sincere thanks and appreciation to Dr. E. A. Chapin of the United States National Museum for the loan of material in his charge, to Mark Robinson for the loan of specimens from his fine private collection, and to Dr. R. H. Beamer of the University of Kansas for the loan of specimens from the Snow collection. Thanks are also due Mr. H. C. Fall for the loan and privilege of dissecting a specimen of the uncommon *Psilocnemis leucosticta* Burm.

In a recent paper by the author¹ the genus *Psilocnemis* was incorrectly placed as a synonym of *Genuchinus*. A subsequent study of specimens kindly loaned to the author by Mr. Fall has shown that the genus is distinct from any of the other known North American genera. The male genitalia are distinctive and the hind wings are like those of *Lissomelas* and *Genuchinus*. The new generic key to follow will point out additional salient characters. A description of *P. leucosticta* is also included as the original is brief and often unavailable.

KEY TO THE NORTH AMERICAN GENERA AND SUBGENERA OF
CREMASTOCHEILINI

1. Anterior angles of pronotum each with a sinus at apex; vein R₃ of hind wings terminating on membranous posterior portion of wing 2
 Anterior angles of pronotum entire; vein R₃ of hind wing terminating on costal margin 3
2. Anterior tarsi without dilated fourth and fifth segment; head without lateral carinae *Cremastocheilus*
 Anterior tarsi with fourth and fifth segments dilated; head with lateral carinae subgenus *Macropodina*
3. Median dorsal surface of scape flat or convex; tarsal constrictions visible, segments not overlapping distally
 *Genuchinus*

¹ Cazier, M. A., *Bul. So. Cal. Acad. Sci.*, 37: 86.

Median dorsal surface of scape concave; tarsal constrictions not visible, segments overlapping distally 4

4. Tarsi sculptured with longitudinal carinae; anterior margin of clypeus acute, beneath with median deep depression

Lissomelas

Tarsi smooth, without carinae; anterior margin of clypeus not acute, prolonged beneath into a wide smooth, flat plate, without median depression. (Fig. 1 and 2)

Psilocnemis

Psilocnemis leucosticta Burm.

P. leucosticta Burm., Handbuch der Entomologie, 42: 677.

P. polita (Schaum), Germ. Zeitschr., 44: 397.

Medium sized, robust, black; pronotal disk with pale yellow bloom laterally, basal half of side margins with the bloom, elytra irregularly bordered with bloom along side margin above reflexed edge. *Head* shining black, occiput with narrow transverse band of bloom extending from margins of eyes, front sparsely, shallowly, punctate, punctures separated by about twice their own widths, becoming obsolete anteriorly, two shallow impressions in front between insertions of antennae; clypeus sericeous, impunctate, sides wider than front between eyes and nearly as wide as width across canthi, front margin at middle prominently reflexed, laterally less so, margin beneath shining black, impunctate; mentum cupuliform, shining black, impunctate, basal margin with prominent median angulation, sides acutely angulate; antennae with triangular scape depressed medially, club three-segmented, as long as scape. *Pronotum* with sides obtusely rounded, widest at apical third, margins acute and prominent, front and hind margins without sinuses, disk opaque, lateral front angles and narrow front margin shining black, sparsely punctate, punctures separated by about four times their own diameters, disk with front and sides bordered with irregular band of bloom which extends to basal side margin, basal margin with prominent depression on either side of middle. *Elytra* with humeral umbones and reflexed side margins shining black, disk opaque and surrounded by an irregular, rather wide band of light yellow (straw colored) bloom, broken only at umbones, punctures acutely lunate, separated by about twice their own widths. *Beneath* shining black, bare, sparsely covered with oblong punctures and depressed lines, tarsi shorter than tibiae, outer edge flat, sides acute, inner apical edge prominent; pygi-

dium densely punctate basally, sparsely towards apex, punctures varying from depressed lines to round punctures with elevated centers.

Length 13 mm., width 6 mm.

Clarendon Co., near Santee River, August 1 to 9, 1896.²

Cremastocheilus (Macropodina) planata Lec. 1863

C. (Macropodina) planata Lec., Smiths, Misc. Coll., 66: 81.

C. (Macropodina) depressa Horn, Trans. Amer. Ent. Soc., 3: 340.

C. (Macropodina) ampla (Csy.), Memoirs on the Coleoptera, 6: 346 (new syn.).

A recent study of the types of the members of this subgenus has disclosed the fact that *C. ampla* Csy. is synonymous with Leconte's *C. planata*. The latter species was described from Arizona and the former from Coastal California (Alameda Co.). The author has in his collection a specimen of *planata* from Big Pine, Inyo Co., Calif., June 8, 1937 (A. P. Yerington), and since this locality is about mid way between the type localities of *planata* and *ampla* and the two forms are conspecific it would indicate a rather wide distribution for *planata*. Typical *planata* was recently collected on the Francis Sims Hastings Natural History Reservation, Santa Lucia Mts., Jamesburg, Monterey Co., California, June 13, 1938 (C. D. Michener).

A number of species have been confused with members of this subgenus, some being incorrectly called *ampla* and others *planata*. The author has been fortunate in obtaining loans of these various species and is here attempting to clarify this rather complex situation. Since *ampla* is, without question, a synonym of *planata* these additional species are apparently without names. Two of these are here described as new.

***Cremastocheilus (Macropodina) puncticollis* Cazier, sp. nov.**

Large, robust, black; elytral disk nearly impunctate. *Head* sparsely punctate, punctures separated by two to three times their own widths, lateral carinae extending along inner margins of eyes, median carina extending to clypeal margin, reflexed portion of front and clypeus with a narrow patch of tomentum at base on either side of median carina, base of head with deep transverse impression; canthus inconspicuous, glabrous; clypeus unequal to width of head at eyes, rounded

² Liebeck, C., Ent. News, 99: 243.

in front, prominently reflexed; mentum cupuliform, shallow, anterior margin evenly rounded, sides subangulate, posterior margin produced at middle into prominent point; antennae ten-segmented, scape large, dorsal surface flattened. *Pronotum* two-thirds as wide as elytra at base, side margins straight, divergent from base to apical third, then obtusely rounded to apical nodes, widest at apical third, basal angles noduliform, anterior median impression shallow, basal median impression deep, surface evenly convex, sparsely punctate, punctures shallow, separated by two to three times their own widths. *Elytra* widest at humeral angles, side margins flexed downward, sinuate behind umbone, subparallel to apical sixth and then evenly rounded to apex; disk smooth except for few irregular, small punctures and shallow scratches, side margins irregularly punctate, apical umbones prominent; scutellum extending to basal third, sharply pointed apically, surface with sparse lunate scratches; meso-episternum prominent, not flattened dorsally. *Beneath* sparsely punctate; femora and tibiae densely punctate, front tarsus with fourth and fifth segments enlarged, middle tarsi normal, hind legs missing, front tibiae bidentate distally; pygidium subcylindrical, sparsely, irregularly punctate.

Length 14 mm., width 6 mm.

Holotype male in the author's collection, collected at Tuba City, Arizona, July 8, 1937, by Mr. R. P. Allen to whom the author is greatly indebted for the type specimen. One male paratype taken at Deep Springs Lake, Inyo Co., California, June 15, 1937, by Mr. J. W. Johnson and very kindly presented to the author.

The paratype specimen differs from the holotype by having the elytra piceous rather than black and by its larger size. Length 15.5 mm., width 6 mm. The piceous color of the elytra may be due to bleaching or immaturity. The specimen was found dead and lacks all the tarsi and the middle and hind legs on one side.

C. puncticollis is closely related to *C. planata* but differs from it by its reduced and sparse punctuation throughout, by the shape of the pronotum which has the side margins angulate at apical third rather than evenly rounded as in *planata*. The apical angles are not as deeply incised before the nodes as in *planata*. In the available specimens of *planata* the clypeal-frontal tomentose area is absent. However, this may be variable. In *puncticollis* the third tarsal segment of the front legs is connected to the fourth at about the middle of the posterior margin of that segment and the fifth segment is rounded laterally, whereas in *planata* the third segment

of the anterior tarsus is connected to the fourth at the extreme outer corner of the posterior margin of that segment and the fifth segment is laterally flattened proximally.

***Cremastocheilus (Macropodina) beameri* Cazier, sp. nov.**

Medium sized, robust, black. *Head* with vertex moderately punctate, punctures separated by about their own widths, front with larger nearly confluent punctures, lateral carinae extending along the inner margins of eyes prominent, median rounded carina extending to clypeal margin, base of head with deep transverse impression; canthus relatively inconspicuous, sparsely clothed with short pile; clypeus reflexed, slightly emarginate at middle above carina, unequal to width of head at eyes; mentum cupuliform, shallow, anterior margin evenly rounded, sides subangulate, posterior margin produced at middle into prominent point; antennae ten-segmented, scape large, dorsal surface shallowly convex. *Pronotum* four-fifths as wide as elytra at base, side margins evenly rounded anteriorly, nearly straight at base, widest at apical third, basal and apical angles noduliform, anterior median impression shallow, posterior impression rather deep; disk with shallow, longitudinal, median impression, surface irregularly punctate, punctures generally separated by about one-half their own widths, open areas often present, laterally more densely punctate. *Elytra* widest at humeral angles, side margins slightly sinuate behind umbone, subparallel to apical sixth then evenly rounded to apex, disk concave, sides rather sharply elevated, large subcylindrical ring-like punctures densely covering surface, often coalescent; scutellum extending to about basal third, sharply pointed posteriorly, sparsely covered with lunate impressions; meso-episternum not flattened above. *Beneath* rather densely covered with lunate impressions, sparsely pilose; legs long, compressed, anterior tibiae bidentate apically, fourth segment of anterior tarsus with upper surface only one-third as long as ventral surface, third segment attached to fourth below upper proximal corner; pygidium subcylindrical, punctures separated by about one-third their own diameters, median carina prominent.

Length 13 mm., width 5 mm.

Holotype male in the collection of the University of Kansas, collected at Douglas, Arizona, San Bernardino Ranch, 3750 ft., August, by F. H. Snow and loaned to the author by Dr. Beamer, after whom the species is gratefully named. One topotypical male

paratype in the author's collection and one male paratype collected in Pima Co., Arizona, Sept. 11, 1914, in the collection of Mark Robinson.

This species most closely resembles *planata* from which it can, however, be distinguished by its smaller size and narrower form. In *beameri* the dorsal surface of the fourth anterior tarsal segment is much shorter than the ventral surface of that segment, whereas, in *planata* the two surfaces are subequal. Also in *beameri* the third segment of the anterior tarsus is attached to the fourth below the upper proximal corner. In *planata* the third segment is attached to the fourth at the proximal dorsal corner.

The anterior tarsi of *beameri* resemble those of *puncticollis* except that the fifth segment is laterally flattened basally in the former and not in *puncticollis*. It can be further separated from *puncticollis* by its large and dense pronotal and elytral punctures. In *puncticollis* the pronotum has sparse, small punctures and the elytra are nearly impunctate but with occasional irregular scratches.

***Cremastocheilus constricticollis* Cazier, sp. nov.**

Medium sized, elytra moderately robust, pronotum slightly more than one-half as wide as elytra; thorax and elytra piceous, head and legs reddish. *Head* with vertex moderately densely punctate, punctures separated by about their own widths, front with transverse impression in front of eyes, front and impression clothed with golden pile, median carina prominent, glabrous dorsally, sides with pile behind and a tomentose patch on either side in front but behind reflexed clypeal margin; clypeus impunctate, as wide as head and strongly reflexed, median reflexed portion extending posteriorly and connecting with carina; mentum cupuliform, front and side margins evenly rounded, posterior margin medially produced into an acute point. *Pronotum* slightly more than one-half as wide as elytra, side margins evenly, obtusely rounded, anterior angles auriculate, inner notch moderately deep, posterior angles acute, straight; surface with median portion opaque, impressed, sparsely, irregularly punctate, lateral surfaces elevated, shining, densely rather deeply punctate. *Elytra* opaque, side margins subparallel, evenly rounded to apex, surface densely covered with elongate punctures, which are nearly coalescent longitudinally and separated by about their own widths transversely. *Beneath* bare, sparsely punctate, anterior tibiae bidentate, posterior tooth distad to middle, tarsi five-segmented, laterally flattened; pygidium roughened, with-

out regular punctures, dorsal two-thirds opaque, ventral one-third shining.

Length 11 mm., width 4.5 mm.

Holotype female in the collection of Mark Robinson, collected at Bonita, Graham Co., Arizona, from the collection of Charles Schaeffer.

This species belongs with the species in the *trinodia* group but is apparently only distantly related to any previously described. It can be separated from all other species by its narrow pronotum, and the transverse impression on the front of the head.

***Cremastocheilus robinsoni* Cazier, sp. nov.**

Rather large, robust; uniform reddish-brown throughout. *Head* with vertex shallowly, sparsely punctate, punctures separated by about their own widths, front projecting outward from eyes, parallel with reflexed margin of clypeus, pointed medially, lower anterior portion abruptly descending to clypeal margin, upper portion deeply, densely, irregularly punctate, lower portion with large impunctate opaque areas laterally, the lower and lateral portion tomentose; reflexed clypeal margin nearly as wide as head, impunctate; antennal scape large, concave; mentum cupuliform, posterior margin produced medially. *Pronotum* about three-fourths as wide as elytra, widest at basal third, sides irregularly rounded anteriorly, anterior angles bluntly produced, inner depression rather deep, posterior angles noduliform and produced outward; an elevated area at basal third of surface, gradually descending to anterior margin, elevated portion densely covered with large shallow punctures, coalescent or separated by about one-sixth their own widths, becoming sparse anteriorly to impunctate area along margin. *Elytra* elongate, robust, side margins subparallel; surface punctate with elongate ring-like punctures, punctures separated laterally by about their own widths; meso-episternum prominent above, middle shallowly concave. *Beneath* glabrous, rather sparsely, lunately punctate; pygidium subcylindrical, irregularly punctate, punctures cylindrical; front tibiae bidentate, nearly impunctate, tarsi moderately flattened laterally.

Length 15 mm., width 6 mm.

Holotype female in the collection of Mark Robinson, collected at Lerdo, Durango, Mexico (Wickham), and turned over to the author for description by Mr. Robinson after whom it is gratefully named.

This species is only remotely related to the other members of *Cremastocheilus* previously described from North America. Its salient characters are the front of the head which is produced and angulate, and the large, concave, meso-episternum. The prothorax resembles somewhat that of *C. nitens* Lec. but the side margins are not serrated and the front angles are more produced. In *nitens* the posterior declivity is more pronounced.

***Cremastocheilus mentalis* Cazier, sp. nov.**

Medium sized; dark, opaque red, rather densely clothed with long brown pile; legs strongly compressed laterally. *Head* with vertex and front cribrately punctate, punctures shallow; frontal carinae prominent and extending to reflexed clypeus, densely clothed with long brown pile, two small apical tomentose patches, one on each side; clypeus as wide as head, sides of reflexed front margin serrate, clothed with long brown pile; mentum cupuliform, subcylindrical, posterior reflexed margin abruptly elevated posterior to lateral obtuse angles, median portion prominent, acutely angulate and abruptly elevated. *Pronotum* trilobed, widest at apical third, sides obtusely rounded to apex and base, not greatly constricted, edges shallowly serrate, apical angles auriculate, basal angles projecting posteriorly, impunctate, shining; surface opaque, except for hind angles, lateral lobes cribrately punctate, middle with irregularly placed rather dense pile and shallow, circular punctures. *Elytra* with sides subparallel, disk shallowly concave, densely covered with oblong punctures, separated by about their own widths laterally, coalescent or overlapping longitudinally, each puncture giving rise to a long brown hair; meso-episternum inconspicuous above. *Beneath* rather densely covered with shallow ring-like punctures and brown pile; all femora and tibiae greatly compressed laterally, moderately clothed with brown pile, anterior tibiae bidentate, middle and hind tibiae with subapical acute spine on outer edge, tarsi five-segmented, flattened laterally; pygidium subcylindrical, median line faint, surface densely punctate and pilose dorsally, becoming sparse ventrally, ventral tip shining.

Length 12 mm., width 5 mm.

Holotype female in the author's collection, collected by Mr. E. R. Leach at Nogales, Arizona, Sept. 6, 1928.

A number of specimens of this species have been seen, by the author, in various collections incorrectly determined as *C. planipes* Horn. *C. mentalis* differs from *planipes* by being smaller, reddish

rather than piceous, by having the punctuation of the head much more dense, the front much more pilose and the hind angles of the pronotum flat above rather than having the outer edges upturned. The compressed legs, mentum and punctuation of the elytra resemble closely those of *planipes*.

Cremastocheilus chapini Cazier, sp. nov.

Medium sized, moderately robust, piceous. *Head* with vertex and front deeply, irregularly, confluent punctate, canthus prominent, extending on front, free end with few short hairs; clypeus as wide as head at eyes, sparsely, finely punctate, front margin semicircular, widely reflexed, sparsely clothed laterally with short stout hair, not carinate medially; antennae ten-segmented, scape large, dorsal surface concave; mentum cupuliform, anterior margin quadrately impressed, lateral angles prominent, posterior margin evenly rounded. *Pronotum* about two-thirds as wide as elytra, side margins obtusely, evenly rounded, widest at about middle, anterior angles blunt and with rather deep quadrate sinuses inside, anteriorly, shallowly auriculate, posterior angles deeply impressed, noduliform; surface with large, shallow punctures separated by about their own widths, sparsely clothed with short, stout setae posteriorly. *Elytra* widest at humeral angles, side margins reflexed downward, sinuate behind humeral umbone, subparallel to apical sixth and then evenly rounded to apex; disk with large, shallow, setigerous punctures which are separated by about their own widths, laterally with punctures deeper and more dense, surface with irregular, elevated, rounded ridges between punctures, setae short; scutellum extending to about basal third of elytra, narrowly pointed posteriorly, surface sparsely punctate apically, densely punctate basally; dorsal portion of meso-episternum prominent, flattened. *Beneath* shining, sparsely hirsute and punctate; anterior tibiae bidentate, middle and posterior tibiae rounded, anterior tarsi rounded, middle and posterior tarsi somewhat flattened laterally, all femora somewhat flattened, tarsi five-segmented; pygidium subcylindrical, irregularly covered with large shallow punctures.

Length 11 mm., width 5 mm.

Holotype female in the collection of the United States National Museum, collected at Yuma, Arizona, August 1902 by H. H. Brown and loaned to the author for study by Dr. E. A. Chapin after whom the species is gratefully named.

This species appears to be most closely associated with *C. nitens* Lec. but differs from that species by having the anterior angles of the pronotum much less constricted, the side margins more obtusely bent, the front angles not pointed, and the anterior sinuses deeper and quadrate. *C. chapini* has the posterior margin of the mentum evenly rounded, whereas, in *nitens* it is distinctly produced and pointed. The elytral punctures in *chapini* are larger and more closely placed than in *nitens*.

***Cremastocheilus pulverulentus* Cazier, sp. nov.**

Medium sized; dark reddish-brown; pronotum, elytra, thoracic sterna, apical margins of abdominal segments and all femora pulverulent. *Head* coarsely, rather closely punctate, front with prominent lateral impressions opposite base of antennae, declivity to clypeus abrupt; clypeus wider than head, reflexed only at center of front margin; mentum cupuliform, wider than long, hind margin strongly reflexed, front margin scarcely so. *Pronotum* widest at middle, margin evenly, obtusely rounded, posterior angles noduliform, anterior angles bluntly rounded, with rather deep inner sinus; surface rather irregular, median portion somewhat impressed, median impressed line faint, large, rather deep setigerous punctures separated by about one-half their own widths, approximate laterally; entire surface except for angles covered with a bloom, angles shining. *Elytra* with sides subparallel; surface nearly flat, apical umbones prominent, setigerous punctures large, rather deep, separated by about their own widths laterally, entire surface covered with bloom. *Beneath* rather densely, setigerously punctate; abdominal segments one to four with apical band of bloom, each band about one-fourth as wide as segment; legs rounded, not greatly compressed, femora only moderately so, front tibiae bidentate distally, middle and hind tibiae with sharp median spine on outer edge, tarsi rather short, somewhat compressed; pygidium subcylindrical, dorsal portion with large, deep, close set punctures, pulverulent, ventral third shining, sparsely, minutely punctate.

Length 12.1 mm., width 5 mm.

Holotype female in the collection of the United States National Museum, collected in New Mexico.

Most closely associated with *C. crinitus* Lec. in the extent of the clypeus, shape of mentum, and punctuation but distinguishable by its evenly rounded side pronotal margins, unraised elytral interspaces, and relatively sparse pile. *C. pulverulentus* can at once be

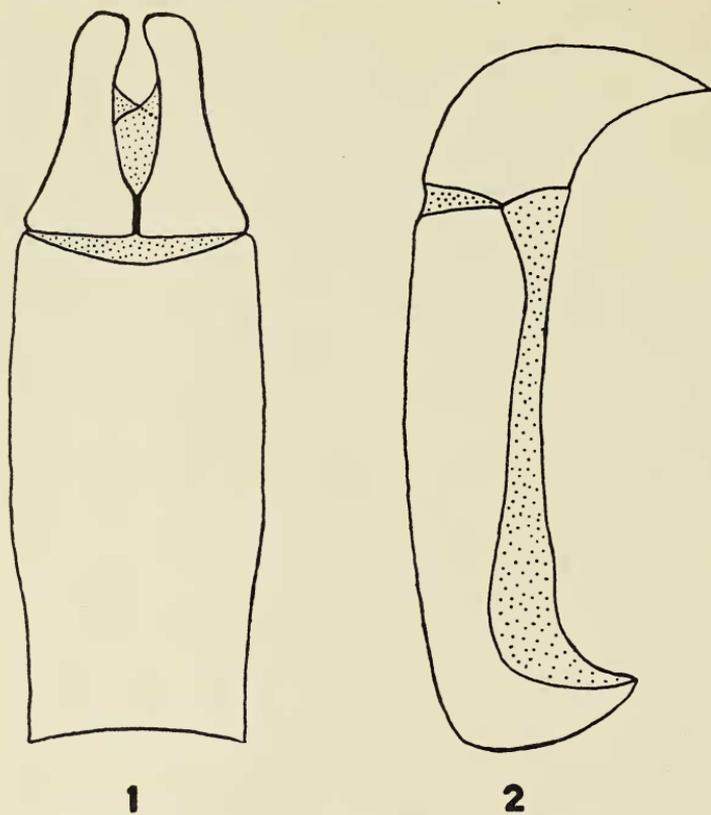


FIG. 1. Male genitalia of *Psilocnemis leucosticta* (dorsal view).
 FIG. 2. Male genitalia of *Psilocnemis leucosticta* (side view).

distinguished from all described species in the genus by the bloom covering portions of the head, pygidium and legs, all of the thorax and elytra and the apical edges of the first four abdominal segments.

***Cremastocheilus excavatus* Cazier, sp. nov.**

Medium sized; dark red, opaque. *Head* shallowly, indistinctly, irregularly punctate; clypeus as broad as head, impunctate, front margin reflexed, median carina small, not extending to upper clypeal margin; mentum somewhat cupuliform, side angles not reflexed, remainder with reflexed margins. *Pronotum* widest at apical third, sides evenly rounded to auriculate apical angles and to deep sinuation anterior to acutely pointed basal angles; surface deeply trilobed, a deep excavation inside and anterior to each basal angle; surface with irregular, indistinct, shallow impressions. *Elytra* with sides subparallel; disk shallowly concave, surface with rather dense,

irregular, shallow, angulate punctures and lines, sparsely clothed with short brown pile. *Beneath* sparsely punctate and pilose; all femora wide, compressed, anterior tibiae moderately convex, middle and posterior tibiae compressed, all tibiae subpedunculate, anterior pair bidentate externally, middle and hind pairs with acute tooth about middle of outer edge, tarsi short, rounded, segments subequal; pygidium large subcylindrical, irregularly lined on surface.

Length 10 mm., width 4.1 mm.

Holotype male in the collection of the United States National Museum, collected by H. F. Wickham at Durango, Mexico. Paratype male collected at Tlalnepantla, Mexico, by O. W. Barrett in the author's collection.

This species most closely resembles *C. saucia* Lec. but can be readily distinguished by its more robust shape, opaqueness, irregular sculpturing throughout, and by its lateral deeply excavated hind pronotal margin.

SOME REFLEX RESPONSES OF *RANATRA FUSCA* TO CONTACT STIMULI.

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The following notes, made some years ago, on the reflex responses of normal and amputated specimens of *Ranatra fusca* may prove of interest to students of insect physiology.

While swimming, *Ranatra* moves each pair of legs in unison; but each pair moves *alternately* with the other pair; that is, as one pair moves forward, the other pair moves back. Often the raptorial legs are alternately extended and flexed. When stroked, the fore legs are stiffened, extended forward; excepting the terminal segment of each leg, which is flexed. At the same time, the remaining legs are extended forward.

This "reaching" response of the middle and last legs disappears when the nerve cord is cut through in the prothoracic region. Both normal specimens and those with severed cord swim forward when the body or breathing tubes are touched.

Destruction of the thoracic ganglion results in cessation of all response in the meso- and metathoracic legs, but leaves the motions of the head and prothoracic legs unaffected.

When placed upon a solid, level surface, specimens completely amputated at the prothorax exhibit tetany; the animal remaining elevated, with only the tarsi and breathing tubes in contact with the